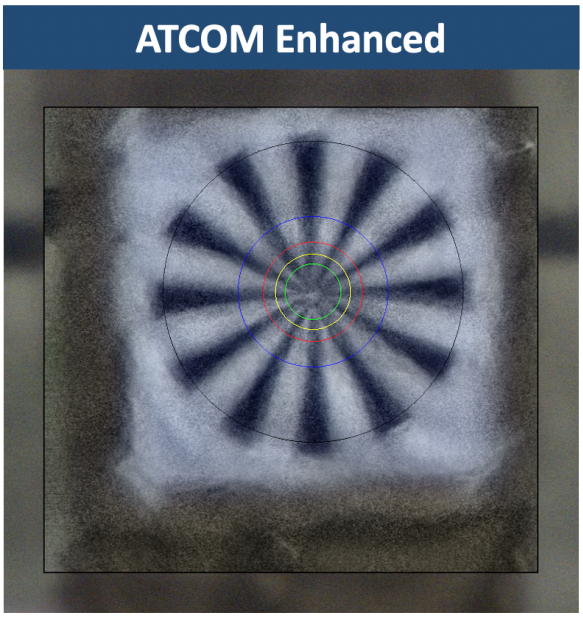
Founded in 2001 EM Photonics has 20 years of advanced computing, algorithm development, algorithm acceleration, and real-time image processing experience. Much of our current work is in improving the quality full motion, particularly video that has been degraded by effects such as atmospheric turbulence. Beyond simply presenting the user an enhanced version of the video, we have quantitively demonstrated improving the actual information of the imagery (see Figure 1). We have used this to demonstrate in real-time to increase the quality and quantity of data which can be extracted by downstream algorithms such as facial recognition (see Figure 2). Combing this work with our own algorithms and those from partners has allowed us to increase the performance of ISR systems and assist in automated analytics tasks.



C_n^2 Value
Contract Requirement: 1.0×10^{-13}
During Image Capture: 1.23×10^{-13}

	Threshold	Objective	Test Result
Distance	650m	650m	787m
GRD	1.5	2.0	2.7
GSD	2.5 px/cm	5.0 px/cm	5.25 px/cm

What Enhancement Provides

In the original image, an operator can resolve an object that is 4" across. Once enhanced by ATCOM, an object 1.48" across can be resolved.

Blue: Original
Red: GRD – Threshold
Yellow: GRD – Objective
Green: ATCOM processed
Black: detected target boundary

Figure 1 – Quantitative example of ATCOM's resolution improvement

Figure 2 – Facial recognition results before (left) and after enhancement (right – enhancement only performed on subject of interest noted by the black box, not the full frame). After enhancement, the correct identification became the top match.

Our real-time video processing technology, ATCOM, is available in hardware or software form factors and can be run standalone or integrated into other systems. ATCOM includes

techniques for turbulence mitigation, image stabilization, local area contrast enhancement, advanced motion handling, super resolution, and r0 estimation (see Figure 3).

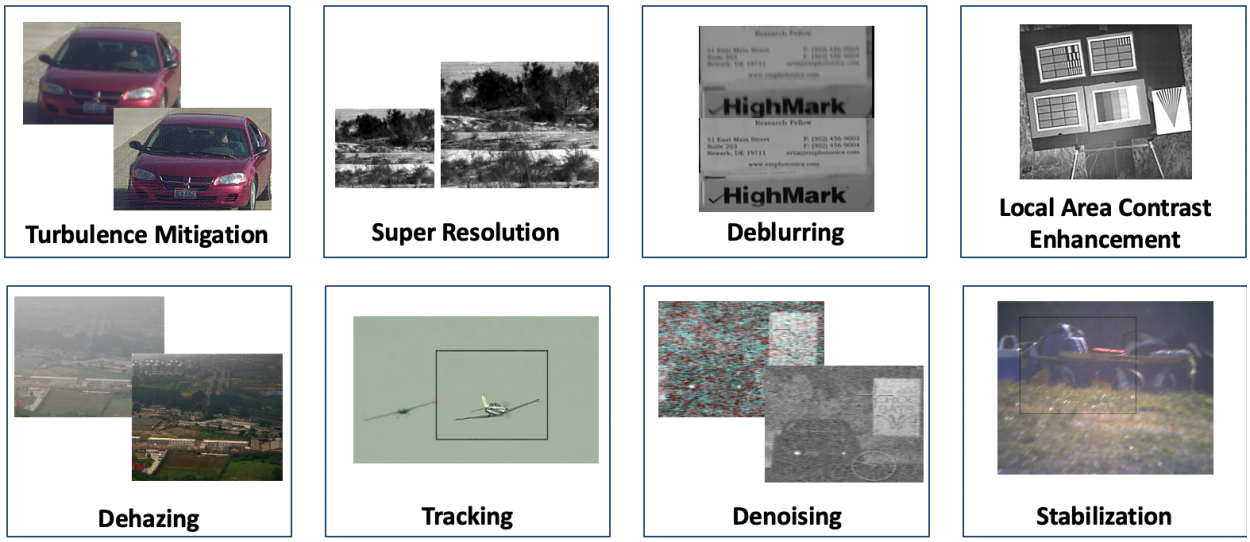


Figure 3 – ATCOM's suite of image processing algorithms

Designed to enable the deployment of ATCOM image enhancement and analytics software at the edge of the battlespace or in covert operations, the ATCOM SHARP device is a ruggedized super-computer is small enough to be carried in a soldiers rucksack and run on batteries (see Figure 4). It contains dual Ethernet and a variety of video I/O ports allowing it to connect to virtually any camera system and its advanced processing architecture allows it to ingest, enhance, and analyze full motion video (FMV) in real-time ingested from a variety of sources.

ATCOM SHARP

- Rugged, low-SWaP, field-deployable video processing platform
- 107 in^3, <3lbs.
- SDI, GigE-Vision, USB3Vision Camera

Figure 4 – ATCOM SHARP rugged image processing computer